AMENDED SPECIFICATION

Reprinted as amended in accordance with the decision of the Assistant Comptroller, acting for the Comptroller-General, dated the thirtieth day of July, 1937, under Section 11, of the Patents and Designs Acts, 1907 to 1932.

PATENT SPECIFICATION

Application Date: Jan. 1, 1936. *No. 2/36.* **451,752**

Accepted: Aug. 11, 1936.

COMPLETE SPECIFICATION

An Improved Felt for use in the Manufacture of Paper, Cardboard and Analogous Materials

We, THOMAS HARDMAN AND SONS, LIMITED, of Fernhill Mills, Bury, in the County of Lancaster, a British Company, and JOHN FORD, of the same address, a British Subject, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to felts for use in the manufacture of paper, cardboard and analogous materials, where a web of pulp is transported continuously through a machine or a series of associated machines in which it is subjected to various manufacturing processes. The invention is more particularly concerned with the manufacture of an endless felt or blanket for supporting the continuous web of paper or like pulp in its passage through a papermaking machine, after removal from the wire-mesh conveyor upon which the pulp is initially deposited, to the subsequent drying and pressing operations at which the excess water content of the pulp is removed preparatory to the calendering operations. It is well-known that the felts employed for this purpose require to be of especially stout formation to enable them to withstand the severe strains to which they are subjected, more particularly when the underside of the felt is in contact with the perforated wall of a "suction roll" cylinder, where a partial vacuum created mechanically within the latter draws a certain proportion of the moisture from the pulp through the felt; in such cases, it has been found that the suction upon the underside of the felt tends to rupture its constituent threads, since the edges of the said perforations wear the threads as the face of the fabric is drawn inwards by the vacuum effect, and the combined strain results in the total destruction of the felt in such a short period that the cost of its frequent replacement becomes disproportionately high.

It has been customary to overcome the aforesaid disadvantage by employing a felt of great thickness and weight, made from a duplex cloth of similar texture on both sides. The increase in the weight of the felt, however, entails the use of a higher suction effort to remove the water content of the pulp, owing to the decrease in porosity of the felt, which in turn correspondingly increases the wear upon its surface and shortens its useful life.

It has also been proposed in Specification No. 421,414 to provide dryer felts for paper making machines constructed of two or more layers or plies characterised by the warps in one or two of such layers or plies forming the back only of the felt being dense and firmly woven and the warps in one or more of such layers adjacent to the working surface being relatively less dense and more openly woven and providing a soft resilient working surface.

The working surface of a felt must be a smooth closely compacted surface so as to mark the paper as little as possible and, in the case of a dryer felt, to press the paper evenly on to the drying cylinder. For these reasons it is desirable to have the working surface as closely woven as possible. On the other hand, moisture must be removed from the paper through the felt and the more open the weave the more porous is the felt and the better is this desideratum obtained. Accordingly the weave of the working surface must be a compromise between these opposing requirements as is well understood.

A felt in accordance with the invention comprises two component fabrics, woven or stitched one above the other, one of such fabrics being finely woven so as to have or to be capable of receiving a smooth closely

compacted surface for the reception and support of the pulp, whilst the other fabric is adapted, by being woven with an open texture and from relatively stouter materials, to withstand the strains to which the felt is subjected in use, and to facilitate the passage of steam or moisture extracted from the pulp.

The nature of the invention is hereinafter more particularly described with reference to the accompanying drawings, in which are exemplified certain embodiments of the invention, as applied to papermakers' felts. Referring to said drawings, Figs. 1 are diagrammatic views depicting four alternative methods of weaving the " face " or pulp-carrying fabric of a composite felt. Figs. 2 are similar views showing two alternative methods of weaving the " back " fabric. Fig. 3 is a similar view showing a convenient method of interweaving the " face " and " back " fabrics to form a single composite felt. Fig. 4 is a conventional weaving diagram of the complete felt exemplified in Figs. 5 and 6, which are respectively a diagrammatic plan of the felt illustrated in Fig. 3, when viewed from the " face " side thereof, and a similar view thereof as seen from the " back " side.

In Figs. 1, the reference numerals 6, 6, etc. indicate the warp threads of the " face " fabric, and 7, 7, etc. the weft threads. Any convenient weave may be employed, although the four alternative arrangements shown in this figure are thought to be those most suitable for the production of a closely woven fabric which will have or, when raised or otherwise dressed in the customary manner, will receive a smooth compacted surface, as best adapted for supporting the pulp without marking it under the suction pressure to which it will be subjected in the de-watering operations.

The weaves which are thought to be most suitable for the production of a " back " fabric of the requisite strength are shown at Figs. 2, in which the numerals 8, 8, etc. represent the warp threads, and 9, 9, the wefts. The yarns from which the " back " fabric is woven are of greater strength than those used for the production of the " face " fabric and we prefer to employ much thicker and stronger yarns. The yarns for either fabric may be of any convenient material; it is customary to employ a shorter fibred woollen yarn for the " face " fabric, but it may be found advantageous to utilise some other animal, vegetable, mineral or artificial substance for the yarns of the " back " component. It will be understood that the open weave of the " back " fabric, as provided in a felt in accordance with the present invention, assists in the removal of the water content of the pulp with the minimum effort and, consequently, with less strain upon the felt than in the case where the suction effect is necessarily higher.

The composite felt illustrated in Figs. 3 to 6 is produced by weaving together a " face " fabric and a " back " fabric by means of auxiliary binding weft threads 10, which pass alternately over two warp threads 6 and under one warp thread 8. In some cases binding warp threads may be used, and in others it may be found desirable to employ both auxiliary wefts and warps for binding purposes. In other modified weaves contemplated by the invention, certain of the wefts or/and warps constituting either or both of the component fabrics may be utilised, and at any desired number of binding points, according to the requirements of the type of felt being manufactured, but it will be understood that every felt made in accordance with this invention consists of two fabrics such that if the means securing them together are removed they will fall apart but will remain fabrics of substantially unaltered character. In the weaving arrangement illustrated in the accompanying drawings, there are two " face " ends or warps 6 to one " back " end or warp 8, and four " face " picks or wefts 7 to two " back " wefts 9 and two binding wefts or picks 10. As already stated, however, any other preferred proportion of ends or picks as between the " face " and " back " fabrics, may be employed.

According to a further modification within the scope of the invention, the scope of the invention, the composite felt may be produced by stitching together two independently woven fabrics respectively possessing the attributes hereinbefore specified.

We are aware that it has been proposed to provide a single-ply papermaker's felt or like woven fabric with a protective covering of floated warp threads and/or weft threads, secured to the foundation fabric by suitable binding threads. It has also been proposed to form dryer felts with a finely woven surface for the reception and support of the pulp and with a back of stronger material and of more open texture to permit rapid evaporation of the moisture. These arrangements, however, differ from that the subject of our present application, in that the latter is characterised essentially by the existence of two independent fabrics.

Having now particularly described and ascertained the nature of our said inven-

tion, and in what manner the same is to be performed, we declare that what we claim is:—

1. A felt for the purpose stated, comprising two component fabrics, woven or stitched one above the other, one of such fabrics being finely woven so as to have or to be capable of receiving a smooth closely compacted surface for the reception and support of the pulp, whilst the other fabric is adapted, by being woven with an open texture and from relatively stouter materials, to withstand the strains to which the felt is subjected in use, and to facilitate the passage of steam or moisture extracted from the pulp, substantially as set forth.

2. A felt as claimed in the preceding claim, wherein the component fabrics are interwoven by auxiliary binding weft or/and warp threads.

3. A felt as claimed in either of the preceding claims, comprising a "face" fabric woven as shown in any of the examples included in Figs. 1 of the accompanying drawings.

4. A felt as claimed in any of the preceding claims, comprising a "back" fabric woven as shown in either of the examples shown in Figs. 2 of the accompanying drawings.

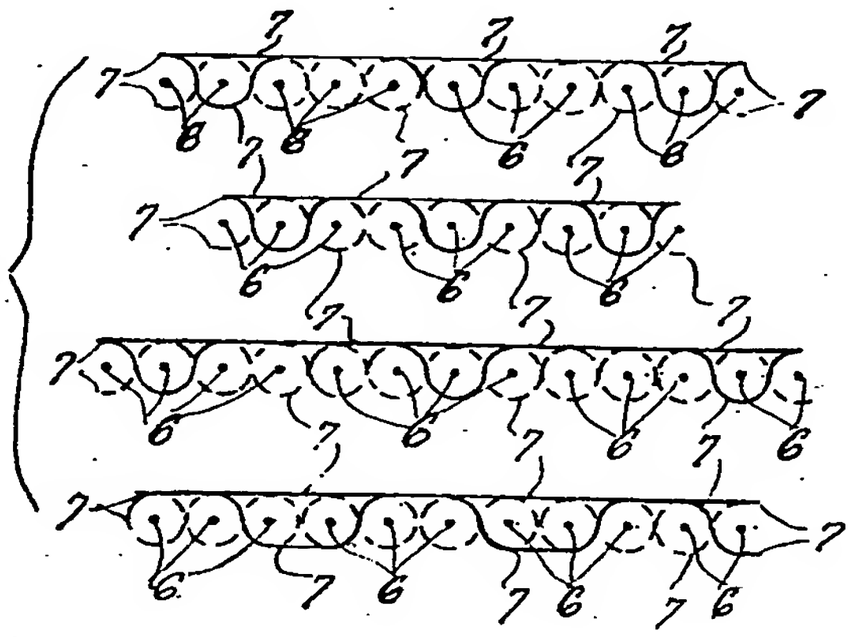
5. The improved felt for use in the manufacture of paper, cardboard and analogous materials, woven in the manner hereinbefore described and illustrated in Figs. 3 to 6 of the accompanying drawings.

Dated this 31st day of December, 1935.
For the Applicants,
WILLIAM GADD & SONS,
62, Barton Arcade, Manchester, 3.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1938.

[This Drawing is a reproduction of the Original on a reduced scale.]

FIGS. 1.



FIGS. 2.

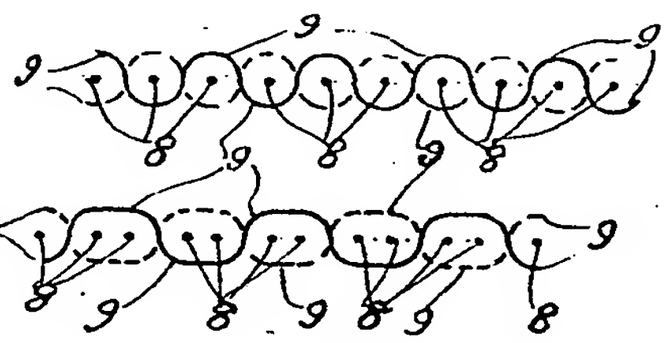


FIG. 3.

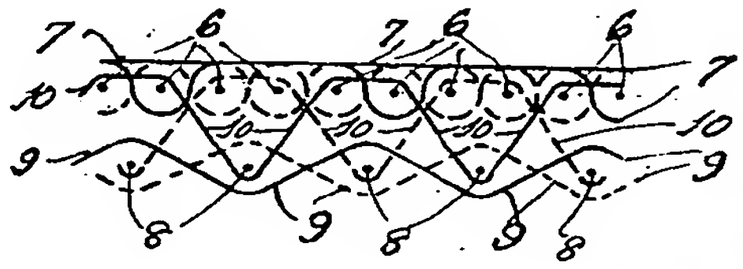


FIG. 4.

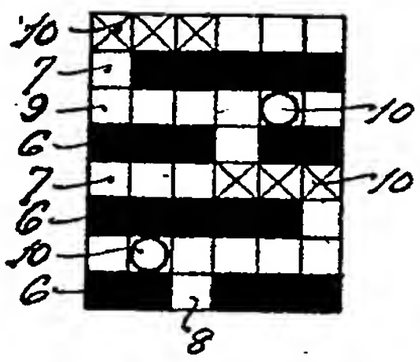


FIG. 5.

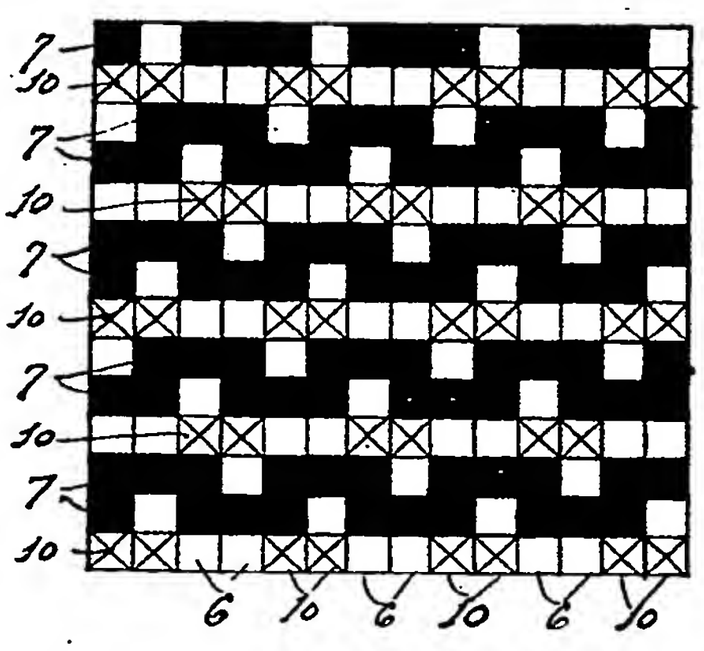
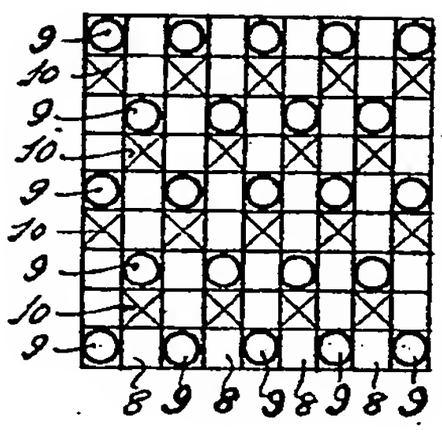


FIG. 6.



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